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Repository Citation

Scarborough, A., Pounds, J., & Bailey, L. (2007). Vehicle Operator Deviations: Predicting Authorized Versus Unauthorized Access on Airport Movement Area. *2007 International Symposium on Aviation Psychology*, 624-624.

https://corescholar.libraries.wright.edu/isap_2007/29

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VEHICLE OPERATOR DEVIATIONS: PREDICTING AUTHORIZED VERSUS UNAUTHORIZED ACCESS ON AIRPORT MOVEMENT AREA

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Introduction

Reducing runway incursions remains one of the Federal Aviation Administration's (FAA's) high priority issues. Over the years, considerable effort has been spent on addressing runway incursions attributable to controller and pilot errors. However, relatively little attention has been given towards identifying the underlying human factors related to vehicle operator deviations (VODs). Vehicle operator deviations associated with unauthorized access onto the airport movement area can pose an additional threat not only to aviation safety, but also to aviation security. Unauthorized access means that the vehicle operator entered the movement area without prior coordination with air traffic control (ATC). We analyzed an archival VOD dataset to identify predictors of VODs that were the result of unauthorized access on the movement area.

Method

Data from VOD reports ($n = 498$) for the period January 2002 to April 2004 were extracted from the National Aviation Incident Monitoring System (NAIMS). Included in the NAIMS database were 22 items relevant to this study. Each item was extracted from the Investigation of Vehicle or Pedestrian Deviation Report Final Form (FAA 8020-25). All 22 items were in a binary format (0= absent/1= present in the incident). The item representing authorized (1) vs. unauthorized (0) access to the movement area was used as the criterion, and the other 21 items were used as predictors. We determined, by cross-tabulating the predictors, that each predictor must have a frequency cell size of five. Based on this decision, seven items were dropped from further analyses. The remaining 15 items were entered simultaneously into a logistic regression analysis. The percent improvement was compared between two regression models. The first model consisted of just the criterion, and the second model consisted of the predictors and the criterion. Odds ratio were calculated for predictors that produced a statistically significant effect.

Results

The model based on the criterion distribution correctly predicted unauthorized access on the movement area 52.5% of the time. When the predictors were included in the model, the prediction accuracy increased to 77.5% (a 25% increase). Four predictors, all of which predicted authorization, had a statistically significant contribution to the criterion. The predictors were a) driver training program (b) movement area conditions (e.g., weather, construction), (c) following routes, and (d) clearance misunderstanding. Respectively, the odds ratios (based on the presence of the predictor) for each predictor were (a) 15.0, (b) 3.80, (c) 10.18, and (d) 3.44.

Conclusion

As shown in this study, vehicle operators (VOs) involved in VODs were 15 times as likely to be authorized to be on the movement area if they had previously completed the driver's training program offered by the airport. However, VOs who do not frequent the airport are not likely to complete training. Thus, non-training interventions, such as improvements in markings outlining the movement area, are recommended to reduce VODs that are the result of unauthorized access to the movement area. These analyses highlighted the importance of looking beyond simply describing the content of safety databases and attempting, instead, to develop predictive models to guide future interventions.